National Geographic has nothing on Sandian

Debora Ley, Sandia team bring renewable energy help to people in rural communities in Central America and Mexico

Story by Iris Aboytes

Running down a mountain screaming to escape from a snake or staying in a remote (but picturesque) hotel where *cucarachas* (cockroaches) hold their own rodeos is probably not how the average Sandia newcomer would imagine spending their first year and a half on the job. Neither did Debora Ley (6233). During her short time at Sandia, she has traveled to the rural areas of Honduras, Guatemala, and Nicaragua. She also has traveled to Mexico, Canada, and Costa Rica.

Debora is assigned to the International Sustainable Engineering Group (ISEG). She is part of a team that works mainly in Mexico and Central and South America. The program has provided energy in a sustainable manner for applications such as televised education, agriculture, protected-areas management, and electrification. The goal is to increase the quality of life for the various communities.

DOE and the US Agency for International Development are sponsors of the work. "They make it possible to provide sustainable energy resources to people who really need and appreciate it," says Margie Tatro (6200).

DEBORA LEY inspects a water pump.

Guatemala

In Guatemala's protected areas, ISEG is trying to combine conservation and development. Reaching Waxabaja, in the Biosphere Reserve of Sierra de las Minas, was quite an adventure. From Guatemala City, it is about a three-hour drive to the nearest hotel. From there, it is another two-hour drive, followed by a four-hour hike up and down and around mountains. Parts of the road/trail are very steep and treacherous, even ledge-like. "It is from about two feet wide to parts where you have to put one foot in front of another and don't look down. As treacherous as some parts are, there are parts that are beautiful — waterfalls, wild flowers, and lush green vegetation," says Debora.

CHILDREN watch as villagers carry turbine up a trail.

Forty-five minutes into the ISEG members' hike, the steeple of Waxabaja's church came into view. Each village in these mountains has its own school, church — in some cases, it's the same building — and a little *tiendita* (store). The *comunidad* (community) is spread out so much that neighbors are a hike apart. Addresses are their cell phone numbers painted on the entrance of the cinder block or wood homes.

"We were panting as we were reaching the top," says Debora. "Little children ran up and down the mountain to see us. They laughed jokingly, as they are used to running up and down the mountain with ease.

The residents in this community are of Mayan decent (Pocomchí). At first glance you notice their shiny teeth, which are a source of pride. Their teeth are inlaid with stars, moons, etc. Their speech is deliberate so as to show their teeth. Waxabaja's main sources of income are cardamom and coffee, grown on the mountain sides.

There is a central area 15 kilometers from Waxabaja where the *mercado* (market) and *Purulhá* — the *cabecera municipal* (county municipality) are located. Waxabaja is the community furthest away.

"Todo lo que sube tiene que bajar" (everything that goes up has to come down), says Debora, "and so did we. The fact that it rained while we were there made me wonder how we were going to do it. I had visions of sliding down the muddy mountain. Getting back was uneventful until I spotted a snake. Hysteria kicking in, I reached the truck 20 to 30 minutes ahead of everyone. Adrenalin works."

Debora has gotten less squeamish since that trip. When she spotted a *masacuata* (boa) on her most recent trip to Guatemala, she calmly swallowed hard, moved to the other side of the boat, and looked at it with binoculars, while thinking to herself, "*Víbora maleducada - su mamá nunca le enseñó a no sacar la lengua*" (Ill-mannered snake, your mother obviously never taught you not to stick your tongue out).

Back at the picturesque hotel, her fellow travelers searched her room for unwelcome visitors. Crawling little creatures, spiders, scorpions, and beetles sometimes enter rooms through the opening below the doors.

A VILLAGER with a solar oven; (inset) a traditional wood-burning oven.

TIKAL, an archaeological site near Waxabaja; the mound is an unexcavated Mayan temple.

Honduras

"In Honduras we [ISEG] are working to integrate energy, productive uses, irrigation, and watershed protection. The advantage of going to Los Suncuyos, Honduras, was that there was a road most of the way to the community. We still had to hike — but not for four hours!" Debora explains.

All electrical connections had been installed in the village buildings, as the residents were waiting for the turbine that would enable the 2 kW pico-hydro system to bring electrical power. "We took the turbine with us, and residents of the village carried it down the mountain," says Debora. "About a month after we were there, the villagers completed the final connections and the village had power. We found out via e-mail a big announcement: *'Por primera vez se vio luz en Los Suncuyos!'* " (For the first time, there is light in Los Suncuyos!)

The people from the different *comunidades* are eagerly awaiting the benefits of having electricity. Some, however, are concerned about how their lives will change. Will they still meet in the center of the village after dark to share cool water or will their evening be taken over by *telenovelas* (soap operas)?

ROOF-MOUNTED solar photovoltaic panels bring change to village.

THE MEN of the village of Los Suncuyos in Honduras carry a turbine up a mountain trail.

Nicaragua

"In Nicaragua we [ISEG] are trying to have the people use solar cookers. We also visited a photovoltaic battery charging station," says Debora.

One of ISEG's goals is to provide residents there with more efficient stoves. The cook stoves they are using currently have a small exhaust or chimney, causing the whole house to be covered with soot. "Their lungs might look the same," says Debora. "While cooking they inhale a lot of carbon monoxide. One of their staples, *frijoles* [beans], for example, requires a long time to cook, so imagine all the carbon monoxide they are inhaling."

Nicaragua has not yet recuperated from an earthquake that hit about 30 years ago and from Hurricane Mitch in 1998. "During our visit there, we had to cross several rivers," says Debora. "The bridges have not been rebuilt since Hurricane Mitch. The deeper parts of river crossings are marked by rocks. When driving, it is better to go with someone familiar with the crossings, because when you ask residents about the deepest parts and where to cross, they just answer *por allá — donde está aquella roca"* (that way, where that rock is).

Mexico

In Mexico ISEG is beginning to integrate Central American activities to Southern/Southeastern Mexico. The region shares Mayan cultures and the *Selva Maya* (the jungle) with Mexico, Guatemala, and Belize. That area also is very rich in Mayan archaeology.

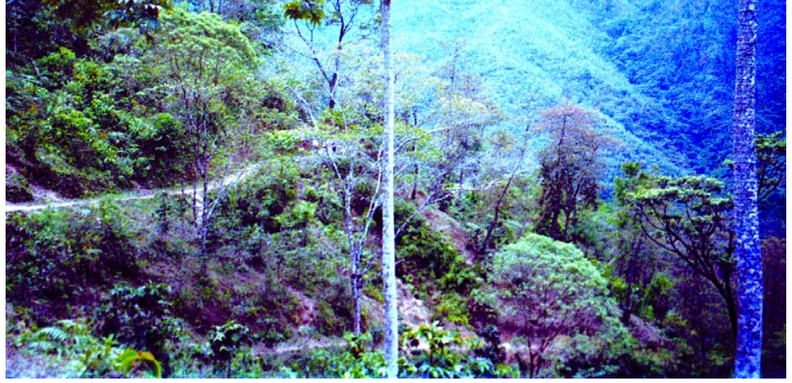
During the last 10 years, more than 400 cost-shared pilot or demonstration solar/wind energy systems have been installed throughout Mexico, promoting awareness and catalyzing market growth of renewable energy technologies. Local training and capacity building have been an integral component of pilot system implementations (workshops, training, monitoring).

Sandia

Back at Sandia, Debora helped write Sandia's presentation for the recent New Mexico visit of Mexican President Vicente Fox.

Retiree Max Harcourt, project leader when Debora first came to Sandia, says, "I really enjoyed working with Debora because of her energy, enthusiasm, and persistence. She is a good mix of technical competence with human empathy. I took a city girl and turned her into a *campo* [country] girl."

"Debora has a unique ability to connect with the people and their cultures in Latin America because of her knowledge of the language and her family background," says Warren Cox (6233).



THE TRAIL to Waxabaja, in Guatemala.

Debora's desire for adventure could have come from her dad, who also worked on renewable energy development in rural Mexico, for example, in the Chiapas jungle. She is working in this same jungle, but on the Guatemalan side of the border. Now they get together and share their experiences. "I wondered why my dad liked a job like that," says Debora. "Now here I am doing the same."

"There is a great amount of personal satisfaction in doing this work," says Debora. "It is not only in providing the energy to the communities, but in teaching and working with the people as they learn to adjust, manage, and adopt this new means to accomplish their daily activities. It's the technical effort teamed with the human element that makes this whole endeavor sustainable."

Debora was not always an adventurer. As a student intern she supported Sandia's Mexico Renewable Energy Program and worked with the solar energy group. She got accepted into the one-year-on-campus program and earned her graduate degree at the University of Colorado at Boulder. For her master's final report she did an energy and water assessment of the Galápagos Islands, off Ecuador's coast. "The animals — iguanas, birds, giant turtles or galápagos — are true residents," says Debora. "They don't hide behind bushes. Instead they act like friendly pets, looking at you with *curiosidad* [curiosity] and introducing themselves by casually nudging you."

Debora cannot sit still, even for a minute. She offers some advice for Sandia travelers: "If you go hiking in a place where there are snakes, make sure you are not the third person in line. I have been told that if there is a snake lying there, the first person will wake it up, the second startles it, and by the time the third person arrives, the snake is ready to attack. I was the third person in line."

For more technical information on Sandia's Mexico Renewable Energy Program go to www.re.sandia.gov.